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Science and Technology for Tomorrow's Air and Space Force

Success Story

MATERIALS AND MANUFACTURING DIRECTORATE EVALUATES EFFECTIVENESS OF LUBRICATION GREASE FOR FLIGHT CONTROLS AND FLIGHT CONTROL ACTUATORS



Longer intervals between grease lubricant maintenance provides the Air Force with a significant cost savings of \$7.2 million over 20 years of aircraft operation, including costs associated with 60,000 hrs worth of unnecessary maintenance and aircraft downtime. By inspecting the operational life of the lubricant, the B-2 Systems Program Office (SPO) safely extended the lubrication maintenance interval for flight controls and flight control actuators from every 600 hrs to every 1,000 hrs—a 67% increase.



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Accomplishment

The Materials and Manufacturing Directorate's participation in a collaborative effort led to the extension of maintenance intervals for lubricant greases used in the flight controls and flight control actuators of the B-2 aircraft. Representatives from Northrop Grumman; Rexnord Shafer, the bearing manufacturer; and the directorate conducted the analysis and made recommendations that resulted in significant time and cost savings for the Air Force, eliminating unnecessary aircraft downtime.

Background

Scientists and engineers from the directorate's Nonstructural Materials Branch, who conduct research and development on nonmetallic, nonstructural materials such as fluids, oils, greases, and solvents, received a request from the B-2 SPO to compare and analyze the effectiveness of the grease lubricant, MIL-PRF-23827, during regular and extended maintenance intervals. MIL-PRF-23827 is diester-base oil grease, supplied by several companies on the military Qualified Product List. This grease minimizes corrosion, wear, and failure in areas where metal components interact with each other.

During the operational life of a lubricant oil, evaporation and exposure to oxygen or water can change the physical and chemical properties of grease, making it less effective. In addition, greases sometimes become contaminated with wear or elastomeric seal debris, which change the consistency of the lubricant and negatively affect the performance of lubricated systems.

Directorate experts examined, compared, and analyzed new, unused grease with samples of used grease, some of which had 600 hrs and some of which had 1,200 hrs of operational life. They analyzed grease samples from four aircraft during maintenance inspections using microscopic and infrared spectroscopic techniques.

Directorate researchers found that while "used" greases had a slightly harder consistency and darker color than new grease, they were not contaminated with wear or seal debris. Researchers concluded the grease was suitable for continued use, had significant life remaining, and that a replacement grease or maintenance was not required.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (02-ML-17)